

# Relationship between Human Body Weight and Specific Gravity of Urine

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DOI: <https://doi.org/10.46431/MEJAST.2024.7204>

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Article Received: 12 February 2024

Article Accepted: 21 April 2024

Article Published: 29 April 2024

## ABSTRACT

The objective of this study was to compare the relationship between human body weight and specific gravity of urine. Urinalysis test is not a painful procedure and it is used to analyze the abnormalities. The comparison between urine density and water density is done by the help of urine specific gravity. The condition of diabetes insipidus can be reported during concentrated urine causes the thirst and removal of excess amounts of dilute urine. Fresh sample of urine was collected in a container and immediately a dipstick method was applied for a few seconds the stick was dipped to check the color change. Statistical analysis was done by applying the rules of M-Stat by using t-Test for getting results. This project is a questionnaire based study about the specific gravity of urine of patients. Urine samples of the patients were collected and then measured the weight of the patients. Results obtained that there was not any relationship between human body weight and specific gravity of urine. It was concluded that there was no significant relationship observed between human body weight and specific gravity of urine.

**Keywords:** Urine specific gravity; Body weight; Urinalysis; Hydration status; Kidney function; Kidney dysfunction; Urinary tract infections; Healthy food; Nutritional deficiencies; Metabolic changes.

## 1. Introduction

Urine specific gravity is a measurement of the concentration of solutes (such as salts, minerals, and waste products) in urine compared to the concentration of these solutes in pure water which is measured by using a urinometer, dipstick test or refractometer. It is an important parameter in medical diagnostics to check hydration status, and various medical conditions. A higher specific gravity indicates more concentrated urine, having higher levels of solutes present, while a lower specific gravity indicates more dilute urine, having lower levels of solutes. Urine specific gravity is often used as a marker of hydration status. When the body is well-hydrated, the kidneys produce more dilute urine with a lower specific gravity. Conversely, when the body is dehydrated, the kidneys conserve water, resulting in more concentrated urine with a higher specific gravity. Monitoring urine specific gravity can help assess an individual's hydration status and guide fluid intake recommendations (M. I. Qadir, 2018).

Urine specific gravity is also used to analyze kidney function. Healthy kidneys are responsible for filtering waste products and maintaining the body's water and electrolyte balance. Abnormal urine specific gravity may indicate underlying kidney dysfunction, such as impaired filtration and associated with various medical conditions. For example, dehydration, adrenal insufficiency, diabetes mellitus, and various kidney disorders can lead to elevated urine specific gravity due to increased glucose excretion. Certain medications and dietary factors can influence urine specific gravity. Consuming foods high in solutes, such as salt or protein, can increase urine specific gravity. Monitoring urine specific gravity alongside other clinical parameters can aid in the diagnosis and management of these conditions. However, interpretation of urine specific gravity results should consider individual factors such as medication use, diet, and underlying medical conditions, in conjunction with other clinical assessments (M. I. Qadir & Javid, 2018).

A urinalysis is a common diagnostic test that evaluates the physical, chemical, and microscopic properties of urine. It provides valuable information about kidney function, hydration status, urinary tract infections, and various

medical conditions. The color of urine can vary depending on factors such as hydration status, diet, medications, and underlying medical conditions. Normal urine is typically clear or slightly cloudy. Cloudiness may indicate the presence of proteins, cells, bacteria, or other substances. The volume of urine produced over a certain period is measured to assess hydration status and kidney function (Ahmad, Qadir, & Ejaz, 2023).

Urine pH is a measurement of the acidity or alkaline nature of urine. Normal urine pH ranges from about 4.6 to 8.0, with variations depending on diet, medications, and underlying medical conditions. Urine specific gravity measures the concentration of solutes in urine compared to pure water. It provides information about hydration status and kidney function. Normal specific gravity ranges from approximately 1.002 to 1.030 (Imran & Hussain, 2019).

Presence of protein in urine (proteinuria) may indicate kidney damage, infection, or other medical conditions. Elevated glucose levels in urine (glucosuria) may indicate diabetes mellitus or other metabolic disorders. Presence of ketones in urine (ketonuria) may indicate diabetic ketoacidosis, fasting, or low-carbohydrate diets. Detection of blood in urine (hematuria) may indicate urinary tract infections, kidney stones, or other conditions affecting the urinary tract. Presence of nitrites in urine may indicate urinary tract infections caused by bacteria that convert nitrates into nitrites.

Microscopic examination of urine sediment can detect the presence of red blood cells, white blood cells, and epithelial cells, which may indicate inflammation, infection, or other kidney disorders. Crystals in urine sediment may indicate conditions such as kidney stones or metabolic disorders. Presence of bacteria, yeast, or parasites in urine sediment may indicate urinary tract infections or other infections. Interpretation of urinalysis results requires consideration of patient history, symptoms, and other laboratory tests. Abnormal findings may warrant further investigation or additional diagnostic tests to determine the underlying cause of urinary abnormalities (M. I. Qadir & Saleem, 2018).

Kidney helps body to maintain optimal electrolyte balance and filter our blood. Urine specific gravity test helps doctor to check kidney function for compensation of any abnormality. Specific gravity test is conducted when we dehydrate, heart failure, shock condition, diabetes insipidus, infection of kidney, UTI and imbalance of sodium level.

Human body weight is a compulsory and a key component for normal health of an individual. Human body weight is measured by weight balance and it is the collectively sum of the bones and organs of body. Healthy food can improve person's normal health. Dairy products, starchy products, vegetables, and fruits are the best sources of energy, rich in carbohydrates and improve our health. By focusing on eating style, we can improve our normal health. The average human body weight can vary on the basis of different factors such as age, muscle mass, height, sex, and overall health. For instance, the body weight of an adult male (around 74 kilograms or 163 pounds) is basically higher than that of an adult female (around 62 kilograms or 137 pounds) due to differences in body composition. But human body weight varies from person to person depending on different factors.

Low weight of an individual may cause many dangerous diseases. Loss of a body weight can even dangerous. Maintaining a healthy body weight is necessary for overall person health. Being underweight or overweight can

increase the risk of various disorders, including diabetes, hypertension, cardiovascular disease, joint problems, and certain cancers. Excessive weight loss or gain can impact immune function, reproductive health, and psychological well-being. We must take proper care about our body weight by consulting with health care providers or dietitians. There must be sufficient foods that produce plenty of fats and sugar.

Body weight alone does not provide a complete picture of a person's health. Body composition, which refers to the proportion of fat, muscle, bone, and other tissues in the body, is also important. For example, a person with a higher proportion of muscle mass may weigh more than someone with the same amount of body fat but less muscle mass. Body composition is often assessed using techniques such as body mass index (BMI), waist circumference measurements, and body fat percentage.

Achieving and maintaining a healthy body weight requires a balanced approach that includes a nutritious diet, regular physical activity, adequate sleep, stress management, and behavioral changes. Crash diets, extreme exercise regimens, and unhealthy weight loss practices can be harmful to overall health and may lead to nutritional deficiencies, muscle loss, metabolic changes, and eating disorders. It's important to adopt sustainable lifestyle changes that promote long-term health and well-being.

Body weight and body image are closely linked, and concerns about weight can have a significant impact on psychological well-being. Negative body image and low self-esteem are common among individuals who struggle with weight-related issues. It's essential to address these psychological factors and promote body positivity, self-acceptance, and a healthy relationship with food and exercise.

It's important to recognize that body weight can vary widely among individuals, and there is no one-size-fits-all approach to weight management. Factors such as genetics, metabolism, age, hormonal changes, and underlying medical conditions can influence a person's weight and response to diet and exercise. Rather than focusing solely on achieving a specific number on the scale, it's crucial to prioritize overall health, fitness, and well-being.

Body weight is an important aspect of health, it's essential to approach it in a holistic manner that considers factors such as body composition, lifestyle habits, psychological well-being, and individual variability. By adopting a balanced approach to weight management and focusing on overall health and well-being, individuals can achieve long-term success in maintaining a healthy weight and improving their quality of life. An appropriate diet is essential for the immune system to work at its best during medical treatment. Physicians also prescribed us some pills that are helpful in gating body weight (M. I. Qadir, Bashir, & Ahmad, 2023).

The objective of this study was to compare the relationship between human body weight and specific gravity of urine.

### 1.1. Study Objectives

The aim of this review are as follows. (i) To study the specific gravity of urine for proper functioning of urinary tract and kidneys. (ii) To study the hydration status of body for maintaining water balance of body. (iii) To study the human body weight for maintaining human health and metabolic process. (iv) To study the comparison of human body weight and urine specific gravity.

## 2. Material and Methods

### 2.1. Measurements of Urine Specific Gravity

In this project 100 male and female participated for urinalysis. Fresh sample of urine was collected in a container and immediately dipstick method was applied and for a few seconds stick was dipped and then allows standing for the color change. The change in color gives the indication about any kind of diseased conditions. Reading was taken for the specific gravity of urine.

### 2.2. Statistical Analysis

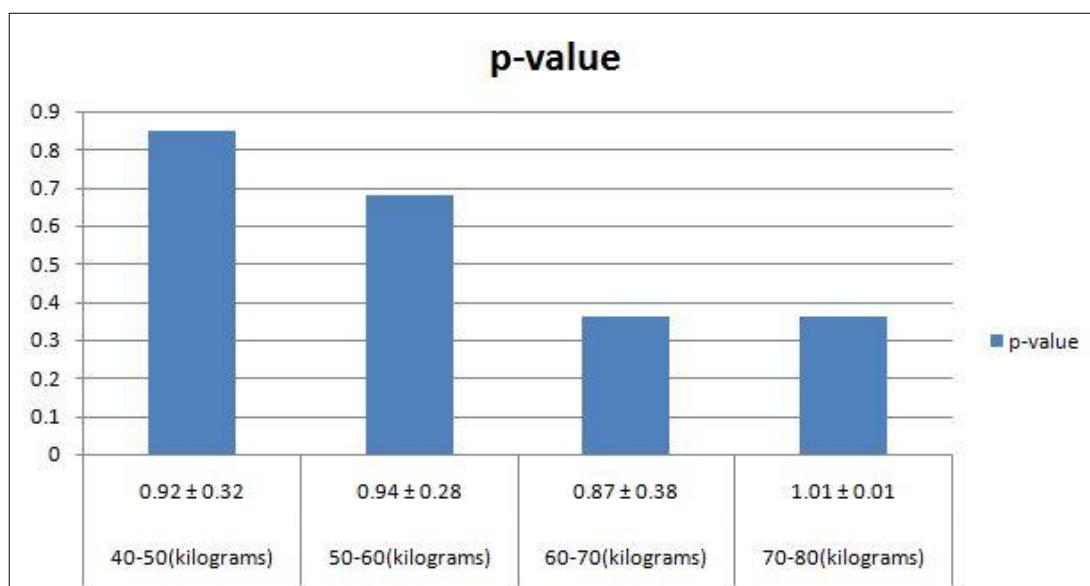
Statistical analysis was done by applying the rules of M-Stat. *t*-Test was applied to deduct these results.

## 3. Results

Results obtained had given the idea about that there was not exist any relationship between human body weight and specific gravity of urine. Urine specific gravity was independent of the body weight. In both the cases, similar results were achieved either in male case or in female case. Urine specific gravity mainly is done due to the non-functioning of kidneys or any other urinary tract infection. It was proved that specific gravity of urine and human body weight was independent of each other.

**Table 1.** Relationship between human body weight and specific gravity of urine

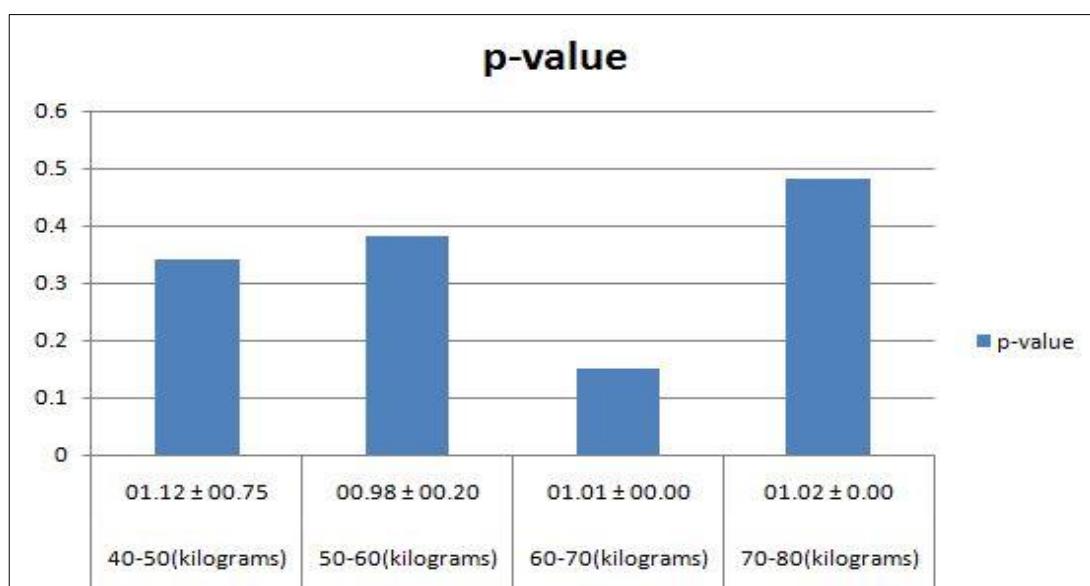
Male Participants	Mean $\pm$ SD	p-value
40-50(kilograms)	0.92 $\pm$ 0.32	00.85
50-60(kilograms)	0.94 $\pm$ 0.28	00.68
60-70(kilograms)	0.87 $\pm$ 0.38	00.36
70-80(kilograms)	1.01 $\pm$ 0.01	00.36



Non- significant ( $p < 0.1$ )

**Table 2.** Relationship between human body weight and specific gravity of urine

Female Participants	Mean $\pm$ SD	p-value
40-50(kilograms)	01.12 $\pm$ 00.75	00.34
50-60(kilograms)	00.98 $\pm$ 00.20	00.38
60-70(kilograms)	01.01 $\pm$ 00.00	00.15
70-80(kilograms)	01.02 $\pm$ 0.00	00.48



Non-significant ( $p < 0.1$ )

#### 4. Discussion

In this project, it was a questionnaire based study in which we asked the patients about their specific gravity of urine. Urine sample of the patients and meanwhile weight of the patients were measured. There were four different categories of body weights and also noted the readings accordingly.

From our results, there were a greater percentage of patients who had negative leukocytes in their urine and their weight was in the range of 50-60 kilograms. In male patients, we recognized the results that specific gravity of urine presence was independent of weight of the patients.

The specific gravity of urine can be calculated by comparing its thickness to that of water. It is typically used to assess how well the kidneys are functioning in order to weaken urine and to show different kidney diseases. The kidney's primary function is the elimination of harmful toxins and waste products produced during metabolism through urine. This specific gravity of urine is determined by the convergence of chemicals released.

An increase in the specific gravity estimate indicates the solutes had a greater concentration, which leads to dehydration, increased sweating, loose stools, and kidney and UT issues. This situation can be prevented by drinking plenty of water or other drinks (M. Qadir; M. Qadir & Shahzad, 2018; M. I. Qadir & Ishfaq, 2018).

- Urine's specific gravity can be determined by matching its thickness with water.
- Urine's specific gravity is basically regulated by the amount of solutes present in the urine.
- Urine specific gravity is also a laboratory test to determine the concentration of all chemicals present in urine.
- This test is basically used to check the urine concentration, the body's water balance, and the functioning of the kidney.
- Urine-specific test is important in treating some health conditions that affect water balance in urine.
- The main function of the kidney is to release toxic poisons and body waste through urination.
- This release of waste decides the unequivocal gravity of urine.
- An increase in the evaluation of explicit gravity implies the solutes had a higher focus resulting in a lack of hydration, loose bowels, additional perspiring, and diseases of urinary tract and kidney.
- Urine-specific gravity can be controlled by drinking a lot of water, stopping soft drinks, and proper medication.
- The lower solute concentration causes disappointment in kidneys causing diabetes.
- Different tests are performed to check the metabolic issue or liver, kidney, and mental conditions in case of higher hydration.
- The osmolality strategy or test is utilized for proper urine investigation.
- More prominent explicit gravity suggests presence of different segments in urine.
- Human body weight is a necessary and an important factor for normal health of a person.
- Weight is measured by weight balance and it is the sum of the bones and flesh of body.
- Health can be improved by eating healthy food.
- Grains, fruits, starchy vegetables, legumes, juices, dairy products, snack foods, and sweets potatoes are the best sources of energy, rich in carbohydrates and their use improve health.
- We can improve our health by focusing on the eating habit and improving our eating pattern.
- Body weight varies in different persons according to different factors such as age, height, and body composition.
- Consulting with a dietitian can help to improve health and daily life style in a perfect way.
- Balanced body weight improves overall quality of life, health and protects from different diseases (M. I. Q. Qadir & Hussain, 2019).

## 5. Conclusion

The relationship between human body weight and urine specific gravity provide the understanding of the hydration status of body and overall health. Individuals with lower urine specific gravity have more diluted urine and better hydration status, while individuals with higher urine specific gravity have more concentrated urine and inadequate hydration. Various factors can influence both body weight and urine specific gravity causes many medical conditions. This relationship is mainly related with hydration status and overall health. All clinical examinations are essential for a better understanding of an individual's hydration status and health. It was concluded that there was no significant relationship is observed between human body weight and specific gravity of urine.

## 6. Future Recommendations

Diagnostic devices to control both urine specific gravity and health can be manufactured with advancement of technology. Early detection of hydration status, urinary tract infections and other disorders would be possible and can be treated in early stages. We can maintain our body health and specific gravity of urine by using clinical applications and applying possible strategies in a proper way.

### Declarations

#### Source of Funding

This study has not received any funds from any organization.

#### Conflict of Interest

The authors declare that they have no conflict of interest.

#### Consent for Publication

The authors declare that they consented to the publication of this study.

#### Authors' Contribution

All the authors took part in data collection, literature review, analysis, and manuscript writing.

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